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Felt

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(54) **ADJUSTING FONT SIZES**

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G09G 5/00	(2006.01)
G09G 5/26	(2006.01)

(52) **U.S. Cl.**

CPC .. ***G09G 5/00*** (2013.01); *G09G 5/26* (2013.01); *G09G 2340/14* (2013.01); *G09G 2354/00* (2013.01)

(58) **Field of Classification Search**

USPC 345/472

See application file for complete search history.

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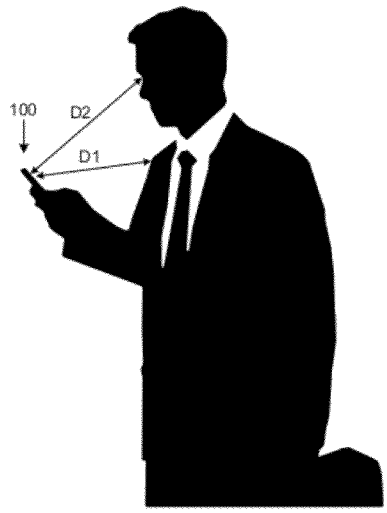
(57) **ABSTRACT**

A device may determine a baseline size of a font, obtain a distance between a user and a mobile device when the baseline size is determined, determine, via a sensor, a current distance between the mobile device and the user, determine a target size of the font based on the current distance, the distance, and the baseline size, set a current size of the font to the target size of the font, and display, on the mobile device, characters in the font having the target size.

20 Claims, 8 Drawing Sheets



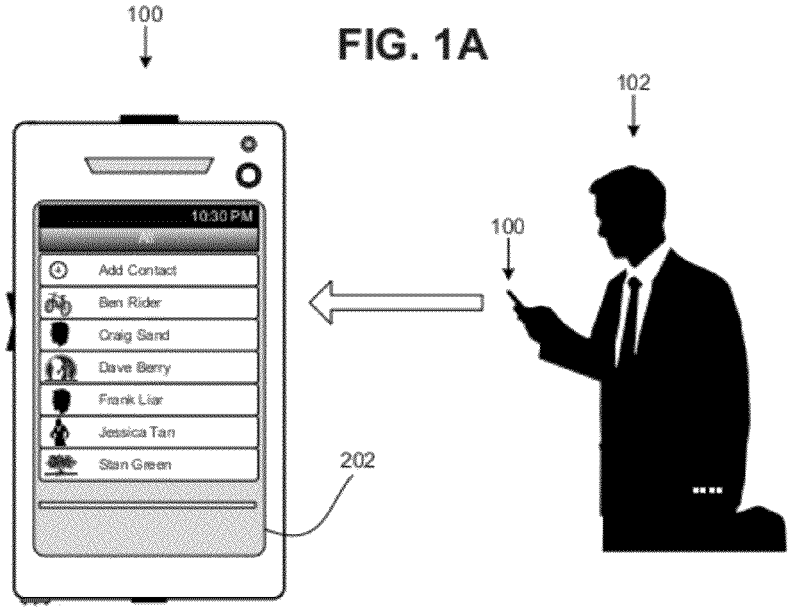

100
102
100
10:30 PM
All
Add Contact
Ben Rider
Craig Sand
Dave Berry
Frank Liar
Jessica Tan
Stan Green
202

FIG. 1A

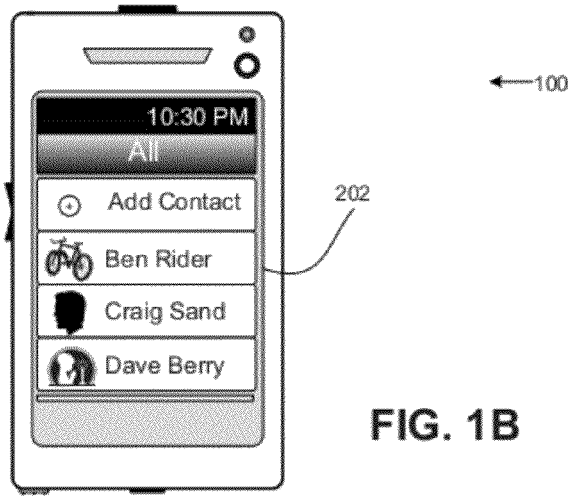

100
10:30 PM
All
Add Contact
Ben Rider
Craig Sand
Dave Berry
202

FIG. 1B

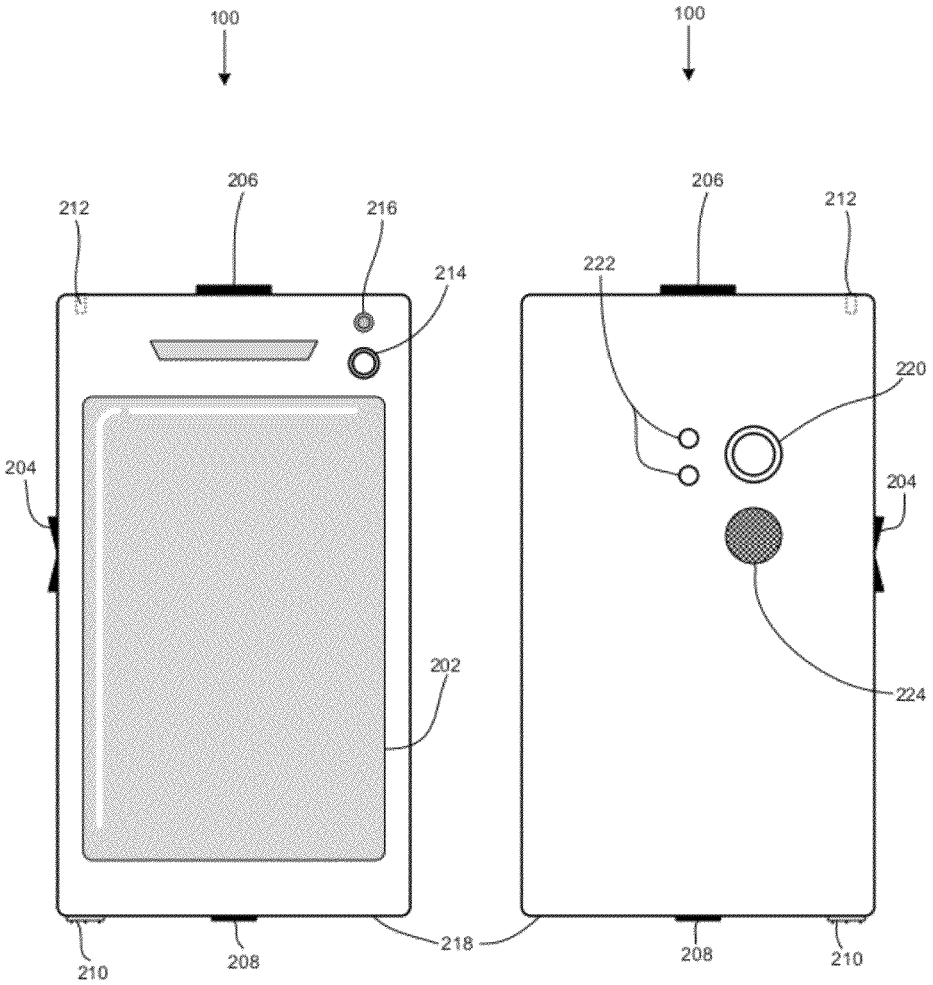

100
206
212
216
214
204
202
210
208
218
100
206
212
222
220
204
224
208
210

FIG. 2A

FIG. 2B

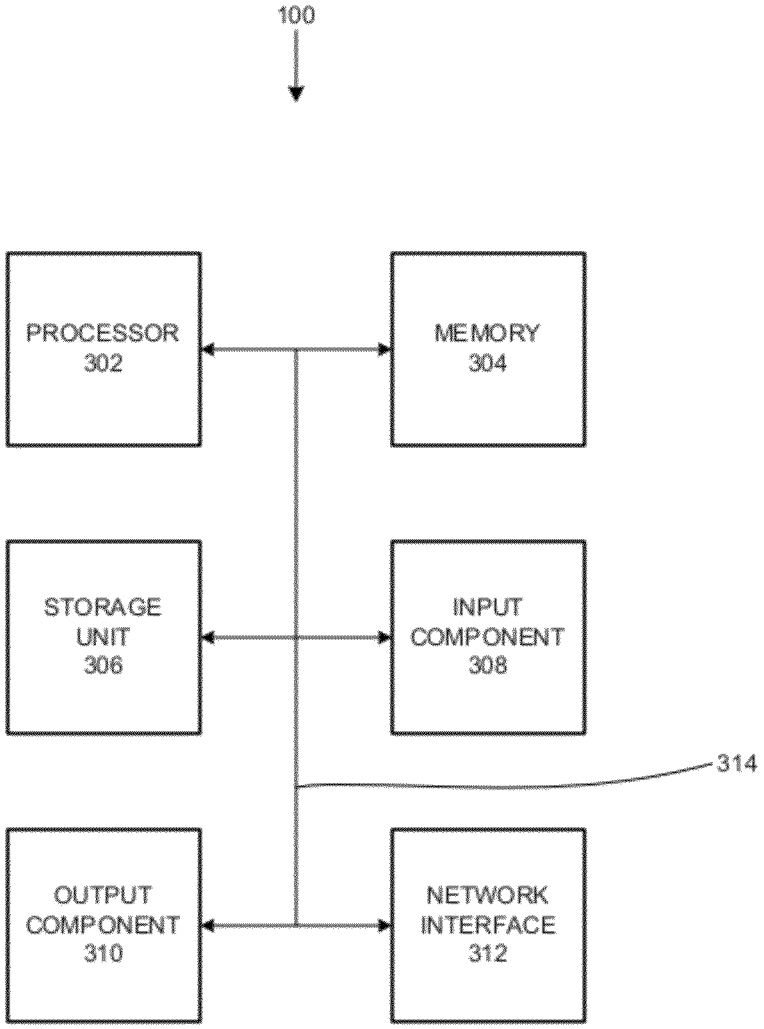

100
PROCESSOR
302
MEMORY
304
STORAGE
UNIT
306
INPUT
COMPONENT
308
314
OUTPUT
COMPONENT
310
NETWORK
INTERFACE
312

FIG. 3

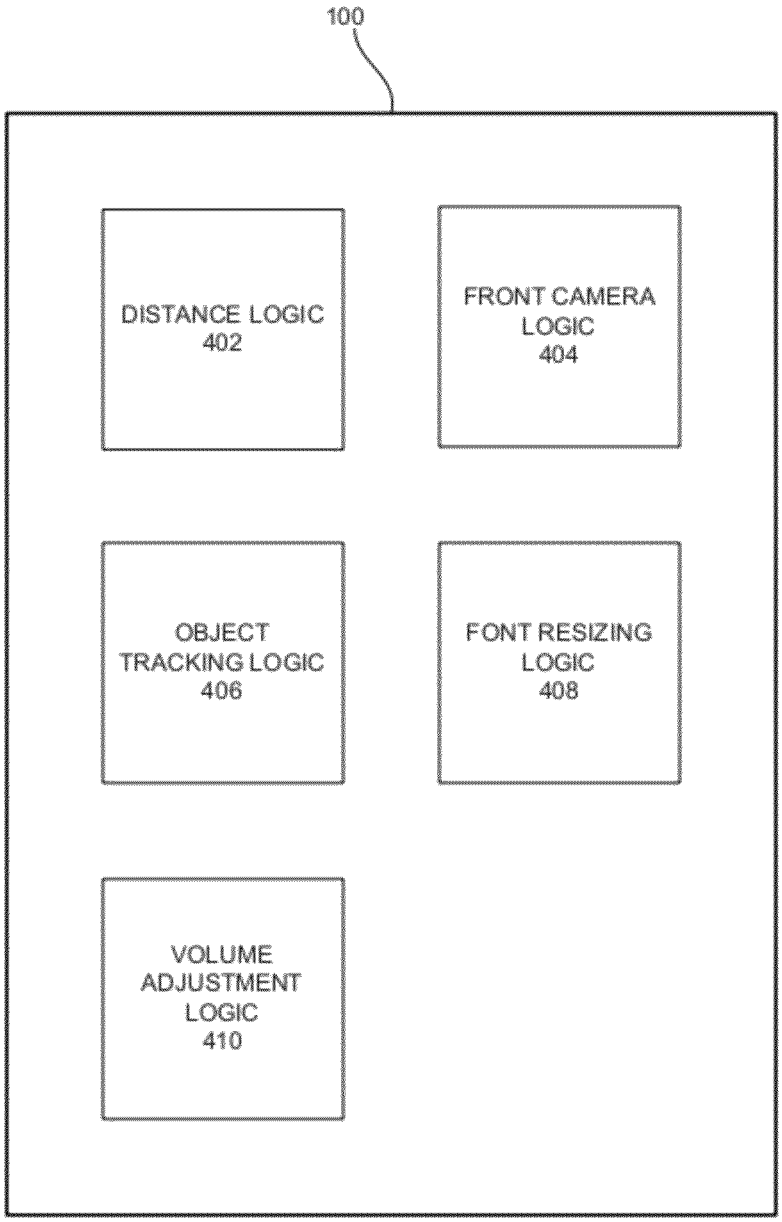

100
DISTANCE LOGIC
402
FRONT CAMERA
LOGIC
404
OBJECT
TRACKING LOGIC
406
FONT RESIZING
LOGIC
408
VOLUME
ADJUSTMENT
LOGIC
410

FIG. 4

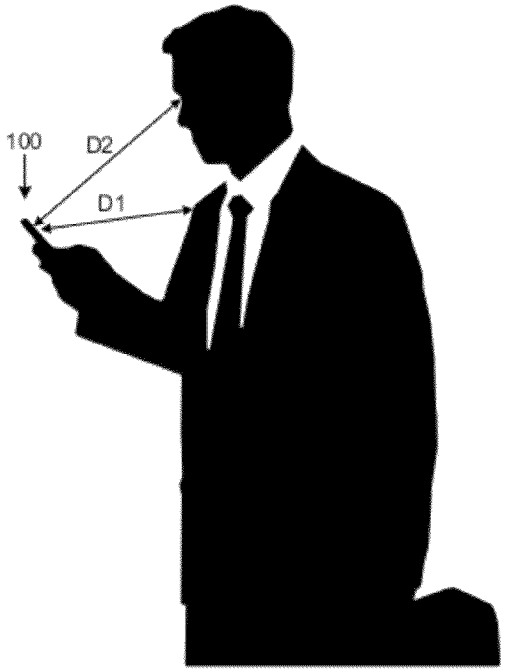


FIG. 5A

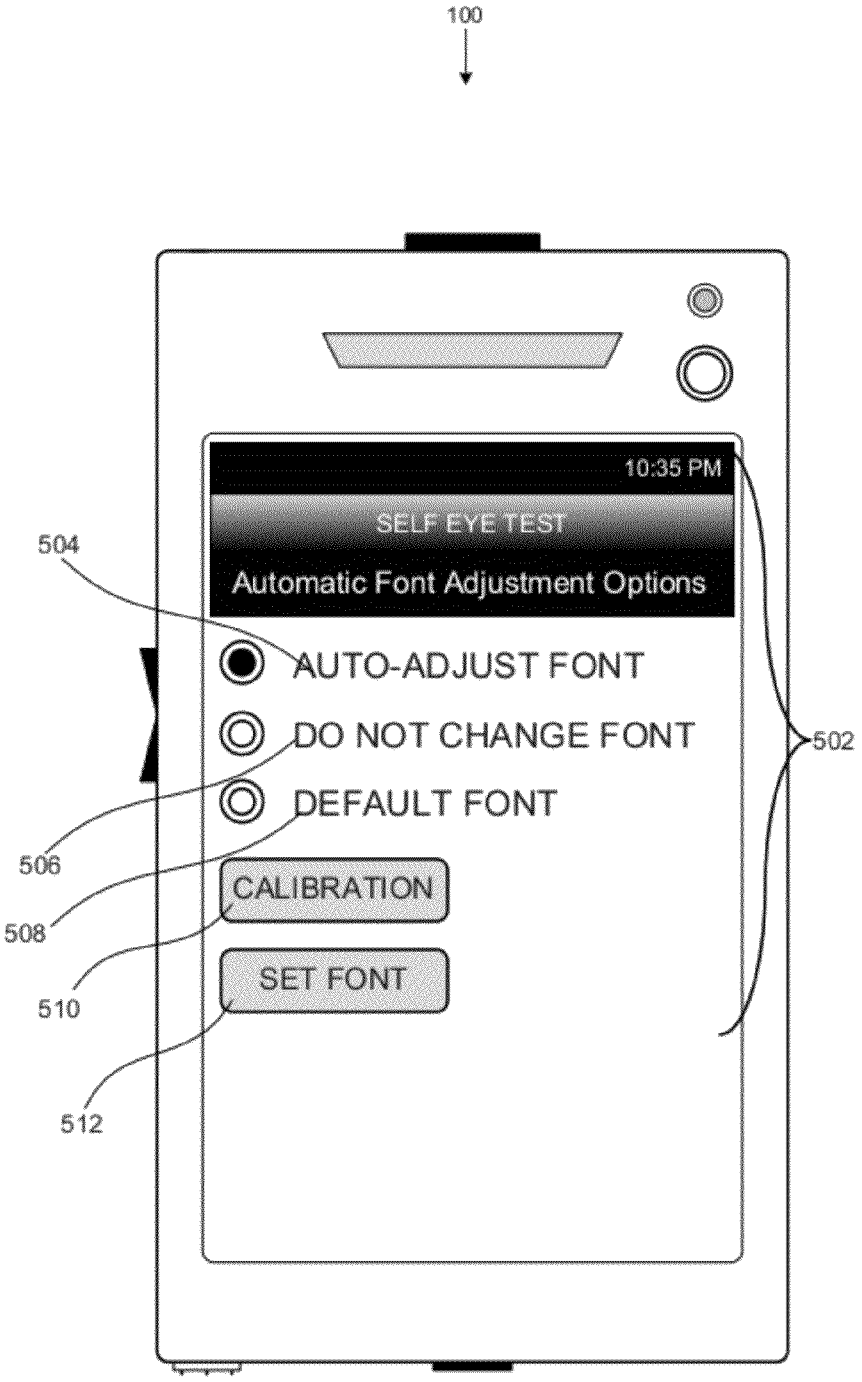

100
10:35 PM
SELF EYE TEST
Automatic Font Adjustment Options
AUTO-ADJUST FONT
DO NOT CHANGE FONT
DEFAULT FONT
CALIBRATION
SET FONT
502
504
506
508
510
512

FIG. 5B

10:35 PM
SELF EYE TEST
Select smallest line print that is readable
+3.00
F
ADQREOTWT
+2.50
E
MFSORJRLF
+2.00
D
KSKDKEFAR
+1.75
C
YWODJSKLEUR
+1.50
B
OTWTEADQRE
+1.25
A
WTEADQREOT
520

FIG. 5C

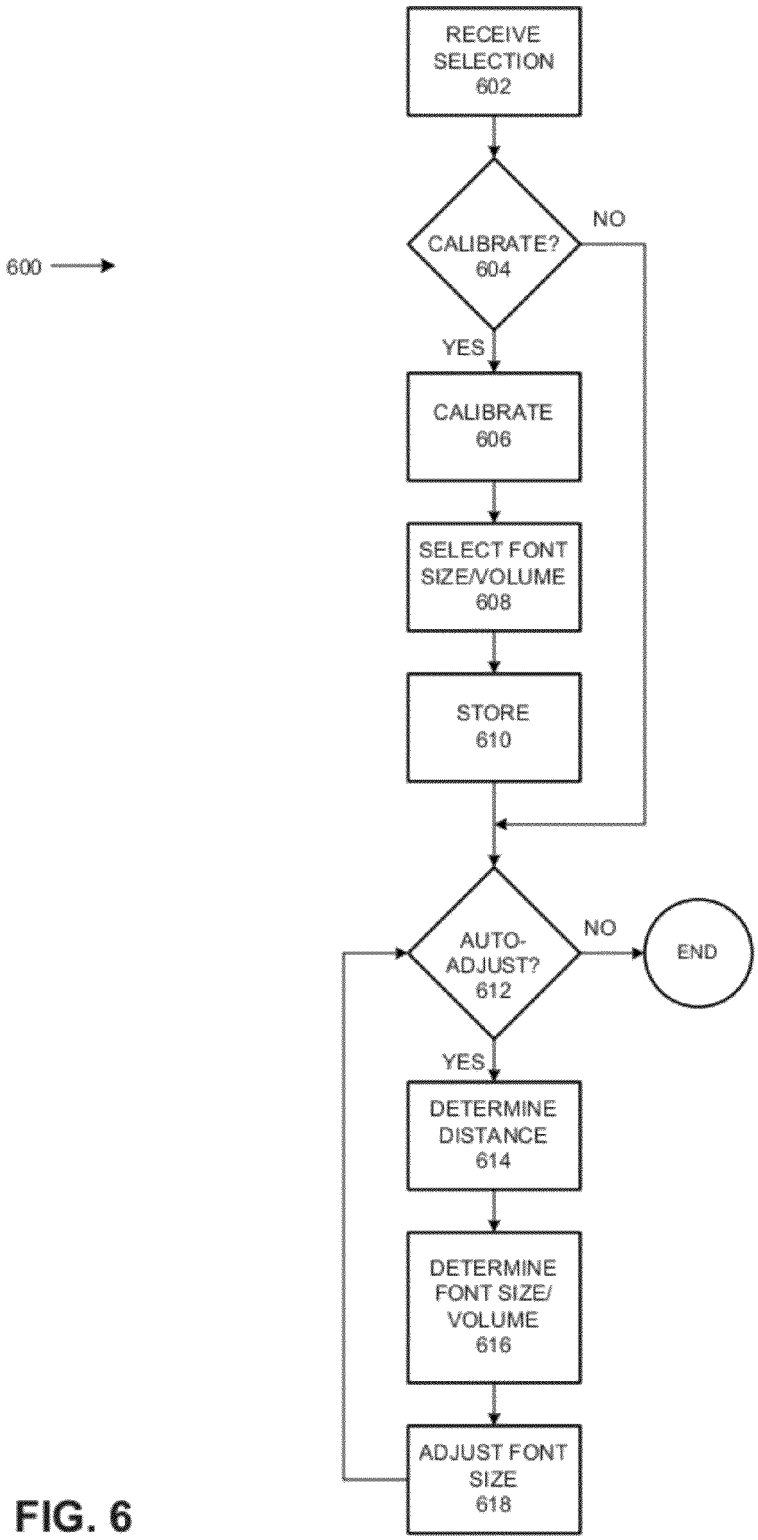

600
RECEIVE SELECTION 602
CALIBRATE? 604
NO
YES
CALIBRATE 606
SELECT FONT SIZE/VOLUME 608
STORE 610
AUTO-ADJUST? 612
NO
END
YES
DETERMINE DISTANCE 614
DETERMINE FONT SIZE/ VOLUME 616
ADJUST FONT SIZE 618

FIG. 6

ADJUSTING FONT SIZES

BACKGROUND INFORMATION

Many of today's hand-held communication devices can automatically perform tasks that, in the past, were performed by the users. For example, a smart phone may monitor its input components (e.g., a keypad, touch screen, control buttons, etc.) to determine whether the user is actively using the phone. If the user has not activated one or more of its input components within a prescribed period of time, the smart phone may curtail its power consumption (e.g., turn off the display). In the past, a user had to turn off a cellular phone in order to prevent the phone from unnecessarily consuming power.

In another example, a smart phone may show images in either the portrait mode or the landscape mode, adapting the orientation of its images relative to the direction in which the smart phone is held by the user. In the past, the user had to adjust the direction in which the phone was held, for the user to view the images in their proper orientation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A and **1**B illustrate concepts described herein;

FIGS. **2**A and **2**B are the front and rear views of the exemplary device of FIGS. **1**A and **1**B;

FIG. **3** is a block diagram of exemplary components of the device of FIGS. **1**A and **1**B;

FIG. **4** is a block diagram of exemplary functional components of the device of FIGS. **1**A and **1**B;

FIG. **5**A illustrates operation of the exemplary distance logic of FIG. **4**;

FIG. **5**B illustrates an exemplary graphical user interface (GUI) that is associated with the exemplary font resizing logic of FIG. **4**;

FIG. **5**C illustrates an exemplary eye examination GUI that is associated with the font resizing logic of FIG. **4**; and

FIG. **6** is a flow diagram of an exemplary process for adjusting font sizes or speaker volume in the device of FIGS. **1**A and **1**B.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The following detailed description refers to the accompanying drawings. The same reference numbers in different drawings may identify the same or similar elements.

As described below, a device may allow the user to easily recognize or read text on the display of the device or hear sounds from the device. After the user calibrates the device, the device may adapt its font sizes, image sizes, and/or speaker volume, depending on the distance between the user and the device. Optionally, the user may adjust the aggressiveness with which the device changes its font/image sizes and/or volume. Furthermore, the user may turn off the font/image-size or volume adjusting capabilities of the device.

FIGS. **1**A and **1**B illustrate the concepts described herein. FIG. **1**A shows a device **100** and a user **102**. Assume that user **102** interacts with device **100**, and selects the optimal font sizes and/or speaker volume for user **102** at a particular distance between user **102** and device **100**. When user **102** accesses a contact list in device **100**, device **100** shows the contact list to user on its display **202**. Device **100** may also be generating sounds for user **102** (e.g., device **100** is playing music).

FIG. **1**B shows the contact list on device **100** when user **102** holds device **100** further away from user **102** than that shown in FIG. **1**A. When user **102** increases the distance between user **102** and device **100**, device **100** senses the change in distance and enlarges the font of the contact list, as shown in FIG. **1**B. If device **100** is playing music, device **100** may also increase the volume. In changing the volume, device **100** may take into account the ambient noise level (e.g., increase the volume further if there is more background noise).

Without the automatic font adjustment capabilities of device **100**, if user **102** is near-sighted or has other issues with vision, reading small fonts can be difficult for user **102**. This may be especially true with higher resolution display screens, which tend to render the fonts smaller than those shown on lower resolution screens. In some situations, user **102** may find looking for a pair of glasses to use device **100** cumbersome and annoying, especially when user **102** is rushing to answer an incoming call on device **100** or using display **202** at inopportune moments when the pair of glasses is not at hand. Although some mobile devices (e.g., smart phones) provide for options to enlarge or reduce screen images, such options may not be effective for correctly adjusting font sizes.

Analogously, device **100** may aid user **102** in hearing sounds from device **100**, without user **102** having to manually modify its volume. For example, when user **102** changes the distance between device **100** and user **102** or when the ambient noise level around device **100** changes, device **100** may modify its volume.

FIGS. **2**A and **2**B are front and rear views of device **100** according to one implementation. Device **100** may include any of the following devices that have the ability to or are adapted to display images, such as a cellar telephone (e.g., smart phone): a tablet computer; an electronic notepad, a gaming console, a laptop, and/or a personal computer with a display; a personal digital assistant that includes a display; a multimedia capturing/playing device; a web-access device; a music playing device; a digital camera; or another type of device with a display, etc.

As shown in FIGS. **2**A and **2**B, device **100** may include a display **202**, volume rocker **204**, awake/sleep button **206**, microphone **208**, power port **210**, speaker jack **212**, front camera **214**, sensors **216**, housing **218**, rear camera **220**, light emitting diodes **222**, and speaker **224**. Depending on the implementation, device **100** may include additional, fewer, different, or different arrangement of components than those illustrated in FIGS. **2**A and **2**B.

Display **202** may provide visual information to the user. Examples of display **202** may include a liquid crystal display (LCD), a plasma display panel (PDF), a field emission display (FED), a thin film transistor (TFT) display, etc. In some implementations, display **202** may also include a touch screen that can sense contacting a human body part (e.g., finger) or an object (e.g., stylus) via capacitive sensing, surface acoustic wave sensing, resistive sensing, optical sensing, pressure sensing, infrared sensing, and/or another type of sensing technology. The touch screen may be a single-touch or multi-touch screen.

Volume rocker **204** may permit user **102** to increase or decrease speaker volume. Awake/sleep button **206** may put device **100** into or out of the power-savings mode. Microphone **208** may receive audible information and/or sounds from the user and from the surroundings. The sounds from surroundings may be used to measure ambient noise. Power port **210** may allow power to be received by device **100**, either from an adapter (e.g., an alternating current (AC) to direct current (DC) converter) or from another device (e.g., computer).

Speaker jack **212** may include a plug into which one may attach speaker wires (e.g., headphone wires), so that electric signals from device **100** can drive the speakers, to which the speaker wires run from speaker jack **212**. Front camera **214** may enable the user to view, capture, store, and process images of a subject in/at front of device **100**. In some implementations, front camera **214** may be coupled to an auto-focusing component or logic and may also operate as a sensor.

Sensors **216** may collect and provide, to device **100**, information pertaining to device **100** (e.g., movement, orientation, etc.), information that is used to aid user **102** in capturing images (e.g., for providing information for auto-focusing), and/or information tracking user **102** or user **102**'s body part (e.g., user **102**'s eyes, user **102**'s head, etc.). Some sensors may be affixed to the exterior of housing **218**, as shown in FIG. **2**A, and other sensors may be inside housing **218**.

For example, sensor **216** that measures acceleration and orientation of device **100** and provides the measurements to the internal processors of device **100** may be inside housing **218**. In another example, external sensors **216** may provide the distance and the direction of user **102** relative to device **100**. Examples of sensors **216** include a micro-electro-mechanical system (MEMS) accelerometer and/or gyroscope, ultrasound sensor, infrared sensor, heat sensor/detector, etc.

Housing **218** may provide a casing for components of device **100** and may protect the components from outside elements. Rear camera **220** may enable the user to view, capture, store, and process images of a subject in/at back of device **100**. Light emitting diodes **222** may operate as flash lamps for rear camera **220**. Speaker **224** may provide audible information from device **100** to a user/viewer of device **100**.

FIG. **3** is a block diagram of exemplary components of device **100**. As shown, device **100** may include a processor **302**, memory **304**, storage unit **306**, input component **308**, output component **310**, network interface **312**, and communication path **314**. In different implementations, device **100** may include additional, fewer, different, or different arrangement of components than the ones illustrated in FIG. **3**. For example, device **100** may include line cards for connecting to external buses.

Processor **302** may include a processor, a microprocessor, an Application Specific Integrated Circuit (ASIC), a Field Programmable Gate Array (FPGA), and/or other processing logic (e.g., embedded devices) capable of controlling device **100**. Memory **304** may include static memory, such as read only memory (ROM), and/or dynamic memory, such as random access memory (RAM), or onboard cache, for storing data and machine-readable instructions (e.g., programs, scripts, etc.). Storage unit **306** may include a floppy disk, CD ROM, CD read/write (R/W) disc, and/or flash memory, as well as other types of storage devices (e.g., hard disk drive) for storing data and/or machine-readable instructions (e.g., a program, script, etc.).

Input component **308** and output component **310** may provide input and output from/to a user to/from device **100**. Input/output components **308** and **310** may include a display screen, a keyboard, a mouse, a speaker, a microphone, a camera, a DVD reader, Universal Serial Bus (USB) lines, and/or other types of components for converting physical events or phenomena to and/or from signals that pertain to device **100**.

Network interface **312** may include a transceiver (e.g., a transmitter and a receiver) for device **100** to communicate with other devices and/or systems. For example, via network interface **312**, device **100** may communicate over a network, such as the Internet, an intranet, a terrestrial wireless network (e.g., a WLAN, WiFi, WiMax, etc.), a satellite-based network, optical network, etc. Network interface **312** may include a modem, an Ethernet interface to a LAN, and/or an interface/connection for connecting device **100** to other devices (e.g., a Bluetooth interface).

Communication path **314** may provide an interface through which components of device **100** can communicate with one another.

FIG. **4** is a block diagram of exemplary functional components of device **100**. As shown, device **100** may include distance logic **402**, front camera logic **404**, object tracking logic **406**, font resizing logic **408**, and volume adjustment logic **410**. Functions described in connection with FIG. **4** may be performed, for example, by one or more components illustrated in FIG. **3**. Furthermore, although not shown in FIG. **4**, device **100** may include other components, such as an operating system (e.g., Linux, MacOS, Windows, etc.), applications (e.g., email client application, browser, music application, video application, picture application, instant messaging application, phone application, etc.), etc. Furthermore, depending on the implementation, device **100** may include additional, fewer, different, or different arrangement of components than those illustrated in FIG. **4**.

Distance logic **402** may obtain the distance between device **100** and another object in front of device **102**. To obtain the distance, distance logic **402** may receive, as input, the outputs from front camera logic **404** (e.g., a parameter associated with auto-focusing front camera **214**), object tracking logic **406** (e.g., position information of an object detected in an image received via front camera **214**), and sensors **216** (e.g., the output of a range finder, infrared sensor, ultrasound sensor, etc.). In some implementations, distance logic **402** may be capable of determining the distance between device **100** and user **102**'s eyes.

Front camera logic **404** may capture and provide images to object tracking logic **406**. Furthermore, front camera logic **404** may provide parameter values that are associated with adjusting the focus of front camera **214** to distance logic **402**. As discussed above, distance logic **402** may use the parameter values to determine the distance between device **100** and an object/user **102**.

Object tracking logic **406** may determine and track the relative position (e.g., a position in a coordinate system) of a detected object within an image. Object tracking logic **406** may provide the information to distance logic **402**, which may use the information to improve its estimation of the distance between device **100** and the object.

FIG. **5**A illustrates an example of the process for determining the distance between device **100** and an object. Assume that distance logic **402** has determined the distance (shown as distance D**1** in FIG. **5**A) between user **102** and device **100**, based on information provided by sensors **216** and/or front camera logic **404**. Object tracking logic **406** may then detect user **102**'s eyes and provide the position (in an image) of user **102**'s eyes to distance logic **402**. Subsequently, distance logic **402** may use the information and D**1** to determine an improved estimate of the distance between device **100** and user **102**'s eyes (shown as D**2**).

Returning to FIG. **4**, font resizing logic **408** may provide a graphical user interface (GUI) for user **102** to select different options for adjusting font sizes of device **100**. FIG. **5**B shows an exemplary GUI menu **502** for selecting options for adjusting the font sizes. As shown, menu **502** may include an auto-adjust font option **504**, a do not change font option **506**, a default font option **508**, a calibration button **510**, and a set font size button **512**. In other implementations, GUI menu **502** may include other options, buttons, links, and/or other

GUI components for adjusting or configuring different aspects of fonts than those illustrated in FIG. **5**B.

Auto-adjust font option **504**, when selected, may cause device **100** to adjust its font sizes based on the screen resolution of display **202** and the distance between device **100** and user **102** or user **102**'s body part (e.g., user **102**'s eyes, user **102**'s face, etc.). Do not change font option **506**, when selected, may cause device **100** to lock the font sizes of device **100**. Default font option **100**, when selected, may cause device **100** to re-set all of the font sizes to the default values.

Calibration button **510**, when selected, may cause device **100** to present a program for calibrating the font sizes to user **102**. After the calibration, device **100** may use the calibration to adjust the font sizes based on the distance between device **100** and user **102**. For example, in one implementation, when user **102** selects calibration button **510**, device **100** may present user **102** with a GUI for conducting an eye examination. FIG. **5**C illustrates an exemplary eye examination GUI **520**. In presenting GUI **520** to user **102**, font resizing logic **408** may adjust the font sizes of test letters in accordance with the resolution of display **202**.

When user **102** is presented with eye examination GUI **520**, user **102** may select the smallest font that user **102** can read at a given distance. Based on the selected font, font resizing logic **408** may select a baseline font size, which may or may not be different from the size of the selected font. Device **100** may automatically measure the distance between user **102** and device **100** when user **102** is conducting the eye examination via GUI **520**, and may associate the measured distance with the baseline font size. Device **100** may store the selected size and the distance in memory **304**.

Returning to FIG. **4**, once the eye examination is finished, font resizing logic **408** may use the baseline font size and the measured distance (between user **102** and device **100** at the time of the eye examination) for modifying the current font sizes of device **100**. For example, assume that user **102** has selected the fourth row of letters (e.g., "+1.50, B") in eye examination GUI **520** and determined the baseline font size based on the selected row of letters. In addition, assume that the measured distance between device **100** and user **102**'s eyes is 20 centimeters (cm). Device **100** may then increase or decrease the current font size relative to the baseline font size, depending on the current distance (hereafter X) between device **100** and user **102**. More specifically, if 5 cm<X<10 cm, 10 cm<X<15 cm, 15 cm<X<20 cm, 20 cm<X<25 cm, 25 cm X<30 cm, or 30 cm<X 35 cm, then device **100** may change the system font sizes by −12%, −7%, −5%, 0%, +5%, +7%, etc., respectively, relative to the baseline font size. The ranges for X may vary, depending n the implementation (e.g., larger ranges for a laptop computer).

Because device **100** may include fonts of different sizes, depending on device configuration and selected options, font resizing logic **408** may change all or some of the system fonts uniformly (e.g., by the same percentage or points). In resetting the font sizes, font resizing logic **408** may have an upper and lower limit. The current font sizes may not be set larger than the upper limit and smaller than the lower limit.

In some implementations, font resizing logic **408** may determine the rate at which font sizes are increased or decreased as a function of the distance between device **100** and user **102**. For example, assume that font resizing logic **408** allows (e.g., via a GUI component) user **102** to select one of three possible options: AGGRESSIVE, MODERATE, and SLOW. Furthermore, assume that user **102** has selected AGGRESSIVE. When user **102** changes the distance between device **100** and user **102**, font resizing logic **408** may aggressively increase the font sizes (e.g., increase the font sizes at a rate greater than the rate associated with MODERATE or SLOW option). In some implementations, the rate may also depend on the speed of change in the distance between user **102** and device **100**.

Depending on the implementation, font resizing logic **408** may provide GUI components other than the ones associated with the eye examination. For example, in some implementations, font resizing logic **408** may provide an input component for receiving a prescription number associated with one's eye sight or a number that indicates the visual acuity of the user (e.g., oculus sinister (OS) and oculus dexter (OD)). In other implementations, font resizing logic **408** may resize the fonts based on a default font size and a pre-determined distance that are factory set or configured by the manufacturer/distributor/vendor of device **100**. In such an implementation, font resizing logic **408** may not provide for calibration (e.g., eye examination).

In some implementations, font resizing logic **408** may also resize graphical objects, such as icons, thumbnails, images, etc. Thus, for example, in FIG. **1**A, each contact in the contact list of FIG. **1**A shows an icon. When user **102** increases the distance between user **102** and device **100**, font resizing logic **408** may enlarge each of the icons for the contacts.

In some implementations, font resizing logic **408** may affect other applications or programs in device **100**. For example, font resizing logic **408** may configure a ZOOM IN/OUT screen, such that selectable zoom sizes are set at appropriate values for user **102** to be able to comfortably read words/letters on display **202**.

Volume adjustment logic **410** may modify the speaker volume based on the distance between user **102** and device **100**, as well as the ambient noise level. Similarly as font resizing logic **408**, volume adjustment logic **410** may present user **102** with a volume GUI interface (not shown) for adjusting the volume of device **100**. As in the case for GUI menu **502**, the volume GUI interface may provide user **102** with different options (e.g., auto-adjust volume, do not auto-adjust, etc.), including the option for calibrating the volume.

When user **102** selects the volume calibration option, device **100** may request user **102** to select a baseline volume (e.g., via the volume GUI interface or another interface). Depending on the implementation, user **102** may select one of the test sounds that are played, or simply set the volume using a volume control (e.g., volume rocker **204**). During the calibration, device **100** may measure the distance between device **100** and user **102**, as well as the ambient noise level. Subsequently, device **100** may store the distance, the ambient noise level, and the selected baseline volume.

In some implementations, device **100** may use factory-set baseline volume level to increase or decrease speaker volume, as user **102** changes the distance between user **102** and device and/or as the surrounding noise level changes. In such implementations, device **100** may not provide for the user calibration of volume. Also, as in the case of font resizing logic **408**, volume adjustment logic **410** may determine the rate at which the volume is increased or decreased as a function of the distance between device **100** and user **102**.

FIG. **6** is a flow diagram of an exemplary process **600** for adjusting font sizes/speaker volume on device **100**. Assume that device **100** is turned on and that user **102** has navigated to a GUI menu for selecting options/components for adjusting font sizes (e.g., GUI menu **502**) or speaker volume. Process **100** may begin by receiving user input for selecting one of the options in the GUI menu (block **602**).

If user **102** has selected an option to calibrate device **100** (block **604**: yes), device **100** (e.g., font resizing logic **408** or volume adjustment logic **410**) may proceed with the calibra-

tion (block **606**). As discussed above, in one implementation, the calibration may include performing an eye examination or a hearing test, for example, via an eye examination GUI **520** or another GUI for the hearing test (not shown). In presenting the eye examination or hearing test to user **102**, device **100** may show test fonts of different sizes or play test sounds of different volumes to user **102**.

In the case of the eye examination, the sizes of the test fonts may be partly based on the resolution of display **202**. For example, because a 12-point font in a high resolution display may be smaller than the same 12-point font in a low-resolution display, font resizing logic **408** may compensate for the font size difference resulting from the difference in the display resolutions (e.g., render fonts larger or smaller, depending on the screen resolution). In a different implementation, the calibration may include a simple input or selection of a font size or an input of user **102**'s eye-sight measurement. In yet another implementation, font resizing logic **408** may not provide for user calibration. In such an implementation, font resizing logic **408** may adapt its font sizes relative to a factory setting.

In the case of the hearing test, in some implementations, rather than providing the hearing test, volume adjustment logic **410** may allow user **102** to input the volume level (e.g., via text) or to adjust the volume of a test sound.

Through the calibration, device **100** may receive the user selection of a font size (e.g., smallest font that user **102** can read) or a volume level. Based on the selection, device **100** may determine the baseline font size and/or the baseline volume level. For example, if user **102** has selected 10 dB as the minimum volume level at which user **102** can understand speech from device **100**, device **100** may determine that the baseline volume is 15 dB (e.g., for comfortable hearing and understanding of the speech).

During the calibration, device **100** may measure the distance, between user **102** and device **100** and associate the distance with the baseline font size (or the size of the user selected font) or the baseline volume level. Device **100** may store the distance together with the baseline font size or the baseline volume level (block **610**). Thereafter, device **100** may proceed to block **612**. At processing block **604**, if user **102** has not opted to calibrate device **100** (block **604**: no), device **100** may proceed to block **612**.

Device **100** may determine whether user **102** has configured font resizing logic **408** or volume adjustment logic **410** to auto-adjust the font sizes/volume on device **100** (block **612**). If user **102** has not configured font resizing logic **408**/volume adjustment logic **410** for auto-adjustment of font sizes or volume (block **612**: no), process **600** may terminate. Otherwise, (block **612**: yes), device **100** may determine the current distance between device **100** and user **102** (block **614**).

As described above, font resizing logic **408** may determine the distance between user **102** and device **100** via distance logic **402**. Distance logic **402** may receive, as input, the outputs from front camera logic **404**, object tracking logic **406**, and sensors **216** (e.g., the output of a range finder, infrared sensor, ultrasound sensor, etc.). In some implementations, distance logic **402** may be capable of determining the distance between device **100** and user **102**'s eyes.

Based on the current distance, device **100** may determine target font sizes/target volume level to which the current font sizes/volume may be set (block **616**). For example, when the distance between user **102** and device **100** increases by 5%, font resizing logic **408** may set the target font sizes of 10, 12, and 14 point fonts to 12, 14, and 16 points, respectively, for increasing the font sizes. Similarly, volume adjustment logic **410** may set the target volume level for increasing the volume. Font resizing logic **408** or volume adjustment logic **410** may target font sizes or target volume that are smaller than the current font sizes or the current volume when the distance between user **102** and device decreases. In either case, font resizing logic **408** or volume adjustment logic **410** may not increase/decrease the font sizes or the volume beyond an upper/lower limit.

At block **618**, device **100** may resize the fonts or change the volume in accordance with the target font sizes or the target volume level determined at block **616**. Thereafter, process **600** may return to block **612**.

As described above, device **100** may allow the user to easily recognize or read text on the display of device **100** or hear sounds from device **100**. After user **102** calibrates the device, device **100** may adapt its font sizes, image sizes, and the speaker volume, depending on the distance between user **102** and device **100**. Optionally, user **102** may adjust the aggressiveness with which the device changes its font/image sizes or volume. Furthermore, user **102** may turn off the font/image-size or volume adjusting capabilities of device **100**.

In this specification, various preferred embodiments have been described with reference to the accompanying drawings. It will, however, be evident that various modifications and changes may be made thereto, and additional embodiments may be implemented, without departing from the broader scope of the invention as set forth in the claims that follow. The specification and drawings are accordingly to be regarded in an illustrative rather than restrictive sense.

For example, in some implementations, once device **100** renders changes in its font sizes or the volume, device **100** may wait for a predetermined period of time before rendering further changes to the font sizes or the volume. Given that device **100** held by user **102** may be constantly in motion, allowing for the wait period may prevent device **100** from needlessly changing font sizes or the volume.

While a series of blocks have been described with regard to the process illustrated in FIG. **6**, the order of the blocks may be modified in other implementations. In addition, non-dependent blocks may represent blocks that can be performed in parallel.

It will be apparent that aspects described herein may be implemented in many different forms of software, firmware, and hardware in the implementations illustrated in the figures. The actual software code or specialized control hardware used to implement aspects does not limit the invention. Thus, the operation and behavior of the aspects were described without reference to the specific software code—it being understood that software and control hardware can be designed to implement the aspects based on the description herein.

Further, certain portions of the implementations have been described as "logic" that performs one or more functions. This logic may include hardware, such as a processor, a microprocessor, an application specific integrated circuit, or a field programmable gate array, software, or a combination of hardware and software.

No element, block, or instruction used in the present application should be construed as critical or essential to the implementations described herein unless explicitly described as such. Also, as used herein, the article "a" is intended to include one or more items. Further, the phrase "based on" is intended to mean "based, at least in part, on" unless explicitly stated otherwise.

What is claimed is:

1. A device comprising:

an output component to provide an audio or visual output;

a sensor to determine a distance between a user and the device;

one or more processors to:

obtain, as a baseline distance between the user and the device, a particular distance between the user and the device via the sensor;

provide test values for the audio or visual output to the user when the distance between the user and the device is the baseline distance;

determine a baseline value based on a test value selected from the test values according to the baseline distance;

after determining the baseline value, determine, via the sensor, a first current distance between the user and the device;

determine a first target value for the audio or visual output based on the first current distance, the baseline distance, and the baseline value;

provide, via the output component, an audio or visual output having a magnitude specified by the first target value;

determine a second current distance between the user and the device;

determine a second target value for the audio or visual output based on the second current distance, the baseline distance, and the baseline value; and

provide, via the output component, the audio or visual output, changing a magnitude of the audio or visual output toward a magnitude specified by the second target value at a speed that is dependent on a user-specified speed preference and a speed of a change from the first current distance to the second current distance; and

a memory to store the determined baseline value, associating with the obtained baseline distance.

2. The device of claim 1, wherein the baseline value, the first target value, and the second target value are represented by:

speaker volume; or a font size.

3. The device of claim 1, wherein the sensor includes:

a range finder; an ultrasound sensor; or an infrared sensor.

4. The device of claim 1, wherein when providing test values for the audio or visual output to the user when the distance between the user and the device is the baseline distance, the one or more processors are further configured to:

provide an eye examination to the user; or

provide a hearing test to the user.

5. The device of claim 4, wherein when the one or more processors provide the eye examination to the user, the one or more processors are configured to:

determine sizes of test fonts to be displayed to the user based on a resolution of the display,

wherein the one or more processors decreases the sizes of the test fonts when the resolution of the display increases, and increases the sizes of the test fonts when the resolution of the display decreases.

6. The device of claim 4, wherein when the one or more processors provide the eye examination to the user, the one or more processors are further configured to:

receive a user selection of a smallest font that the user can read.

7. The device of claim 6, wherein when the one or more processors determine the baseline value, the one or more processors are further configured to:

set the baseline value to be a size of approximately the smallest font that the user can read when the user and the device are apart by the baseline distance.

8. The device of claim 1, wherein the one or more processors is further configured to:

provide a plurality of characters to the user, wherein the plurality of characters have different font sizes, respectively;

receive a selection of a smallest font size, as selection of the test values, among the different font sizes, that the user can read at the particular distance; and

set the baseline value to approximately the smallest font size.

9. The device of claim 1, wherein the one or more processors are further configured to: after changing the magnitude of the audio or visual output toward the second target value, wait for a predetermined period of time before rendering further changes to the magnitude of the audio or visual output.

10. The device of claim 1, wherein when the one or more processors determine the first target value, the one or more processors determines the first target value to be no greater than a predetermined upper limit.

11. A method comprising:

obtaining, as a baseline distance between the user and the mobile device, a particular distance between the user and the mobile device via a sensor;

providing test font sizes to the user when the distance between the user and the device is the baseline distance;

after determining the baseline font size, determining, via the sensor, a first current distance between the mobile device and the user;

determining a first target font size based on the first current distance, the baseline distance, and the baseline font size;

displaying, on the mobile device, characters in the font having the first target font size;

determining a second current distance between the user and the device;

determining a second target font size based on the second current distance, the baseline distance, and the baseline font size; and

displaying, on the mobile device, character, changing a font size of the characters toward the second target font size at a user-selected speed.

12. The method of claim 11, wherein the sensor includes a component for auto-focusing a camera of the mobile device.

13. The method of claim 11, wherein providing test font sizes to the user when the distance between the user and the device is the baseline distance includes:

providing a graphical user interface for conducting an eye examination; or

receiving user input that specifies visual acuity of the user.

14. The method of claim 13, wherein the conducting the eye examination includes:

receiving a user selection of a smallest font that the user can read at the distance; and

determining the baseline font size to be approximately the smallest font.

15. The method of claim 13, wherein the providing the graphical user interface includes:

displaying test fonts whose sizes are determined based on a resolution of a display of the mobile device,

wherein the test font sizes are decreased when the resolution of the display increases, and the test font sizes are increased when the resolution of the display decreases.

16. The method of claim **11**, wherein the determining the first target font size includes: determining the first target font size to be no greater than a predetermined upper limit.

17. A non-transitory computer-readable medium, comprising computer-executable instructions for configuring one or more processors to:

obtain, as a baseline distance between a user and the mobile device, a particular distance between the user and the mobile device via the sensor;

provide test volume levels to the user when the distance between the user and the device is the baseline distance;

determine a baseline volume level based on a test volume level selected from the test volume levels according to the baseline distance;

determine, via the sensor, a first current distance between the user and the mobile device;

determine a first target volume level of the speaker based on at least the first current distance, the baseline distance, and the baseline volume level;

set a first current volume level of the speaker to the first target volume level of the speaker;

generate, from the mobile device, sounds having the first target volume level;

determine a second current distance between the user and the mobile device;

determine a second target volume level of the speaker based on at least the second current distance, the baseline distance, and the baseline value;

change a volume of the speaker at a speed that is dependent on a speed of a change from the first current distance to the second current distance; and

generate, from the mobile device, sounds, changing a volume level of the sounds toward the second target volume level at a speed that is dependent on a user-specified speed preference and a speed of a change from the first current distance to the second current distance.

18. The non-transitory computer-readable medium of claim **17**, further comprising computer-executable instruction for configuring the one or more processors to determine ambient noise, wherein the computer-readable medium further comprises computer-executable instruction for configuring the one or more processors to,

when the one or more processors determine the first target volume level,

determine the first target volume level of the speaker based on the first current distance, the distance, the baseline volume level, and the ambient noise level.

19. The non-transitory computer-readable medium of claim **17**, wherein the computer-executable instruction for configuring the one or more processors to provide test volume levels to the user when the distance between the user and the device is the baseline distance includes a computer-executable instruction for configuring the one or more processors to provide a hearing test to the user.

20. The non-transitory computer-readable medium of claim **17**, wherein the computer-executable instruction for configuring the one or more processors to determine the first target volume level includes a computer-executable instruction for configuring the one or more processors to determines the first target volume level to be no greater than a predetermined upper limit.

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